the chart; the lowest reported barometer was at Thatcher's Island, 28.96 or more than one inch below the mean. High northeasterly gales prevailed on the New England coast during this and the previous day. Cautionary Signals were ordered for this storm on the 28th at Milwaukee and Grand Haven, only justified at Milwaukee by a maximum velocity of 29 NE.; also ordered on the 28th from Smithville to Cape Henry, and from Chincoteague to Cape May; on the 29th from Pensacola to Charleston, and from Atlantic City to Wood's Holl; on the 30th from Boston to Eastport. These signals were generally justified by the following maximum velocities: Pensacola, 32 NW.; Cedar Keys, 39 NW.; Jacksonville, 42 SW.; Savannah, 32 W.; Charleston, 32 W.; Smithville, 32 SW.; Wilmington, 30 W.; Macon, 28 S.; Hatteras, 58 SW.; Kittyhawk, 55 W.: Cape Henry, 29 W.; Norfolk, 30 SW.; Chincoteague, 40 W.; Delaware Breakwater, 38 SW.; Cape May, 44 W.; Atlantic City, 47 NE.; Barnegat, 52 E.; Sandy Hook, 56 E.; New York, 48 NE.; New Haven, 28 NE.; New London, 27 E.; New Shoreham, 52 NE.; Wood's Holl, 29 E.; Boston, 41 NE.; Thatcher's Island, 65 NE.; Portland, 26 NE.; Eastport, 46 NE. On the 30th, Cautionary Signals were changed to Cautionary Off-shore from Hatteras to Cape May, and on the 31st from Atlantic City to Wood's Holl. These were generally justified both as to direction and as to velocity.

INTERNATIONAL METEOROLOGY.

Two international charts accompany the present REVIEW. No. IV is for the month of February, 1881. No. V is for the month of April, 1877, and is published in accordance with the explanation given in the opening paragraph under International Meteorology in the January, 1881, REVIEW.

Chart No. IV, for the month of February, 1881, indicates, as well as is at present (April 16, 1881,) possible, the general course taken by the most prominent storm-areas over the North Atlantic ocean and adjacent land-areas during that month. The tracks Nos. I, IV and VI are continuations of Nos. I, IV and IX, respectively, of chart No. I for February. Only one (No. I) storm appears to have crossed the Atlantic from the American to the European seaboard, but this is pretty well defined, and, from present indications, was, in all probability, a most severe storm. Originating probably within the area of heavy rains on the Pacific coast, (see MONTHLY WEATHER REVIEW *for January, low barometer area* No. IX,) it afterwards moved across the eastern half of the United States and western portion of the Atlantic with great rapidity, its progressive velocity, from 8 a. m. to 3 p. m. of the 1st, while traversing Tennessee and North Carolina, averaging 75 miles per hour. In its journey eastward it was marked by a gradually falling barometer and by severe gales, the pressure at the centre of depression, while the storm was over the United States, being about 29.80, while over the central Atlantic it fell to about 29.50 and over the British Isles to about 28.90. On the coast of the Atlantic States the wind reached a velocity of 56 miles per hour at Cape May; in 39 N., 74 W., brig. *Atlas* experienced a furious gale, heavy sea and intense cold, during which the vessel became completely iced up; in 41 N., 54 W., steamer *Rheola* had hurricane with heavy seas sweeping decks. Over mid-ocean the winds decreased somewhat, but as the storm approached the British Isles it was again attended by violent winds. Over the North American continent and western portion of the Atlantic this depression was followed by a period of high barometer and low temperature, which in duration and severity, *is almost without precedent.* In regard to this, within the limits of the United States and Canada, attention is asked to the description of high areas and to the chapters on *Temperature* in the January and February REVIEWS, while in regard to Central America the following despatch, dated Panama, February 24, 1881, will be read with interest:—"The 10th of February will be remembered in Guatemala as the occasion of a frost, the heaviest within the memory of man, occasioning damage the like of which has no record in the history of the country since its conquest by the Spaniards. Ice formed in many places * * ; leaves and tender shoots of coffee trees were shrivelled and discolored and sugar canes killed * * . The amount of damage is estimated to be between one and two millions of dollars. The cold wave seems to have come from the north, apparently traversing the Cordilleras through Mexico and leaving evidences of its effect in various parts of that country before reaching Guatemala." In advance of these high pressures NE'ly high winds and gales were experienced over the western portion of the Atlantic, and at the Bermudas cold weather, with rain or hail squalls, prevailed *from the 4th to the 8th*, the minimum thermometer at Gibb's Hill Light station on the morning of the 7th registering 51°, which is the lowest temperature experienced at this place, according to the records at hand, since February, 1879. Areas Nos. III and V appear to have originated in or about mid-ocean on the 8th and 13th, respectively. During the passage of No. III over the British Isles the barometer at Mullaghmore fell to 28.48, and on the 13th, (see area No. V,) the barometer on board S. S. *Belgenland*, in 49° N., 25° W., fell to 29.00 during a SW. gale, force 10 Beaufort scale. On the 14th high pressures set in over northern Europe, and apparently formed a barrier to the eastward progress of storm-areas from the Atlantic over the British Isles. By the 20th the barometer had increased to 30.9 over Sweden and northern Russia and the area of high pressure gradually spread eastward, reducing the pressure over the British Isles for the week ending Feb-

ruary 28th to about 7 degrees, Fahrenheit, below the mean. During the regime of the high pressures over North America and northern Europe, the barometer reached 30.91 at Burlington, Vermont, on the 6th and 31.00 at Moscow on the 21st. These maximum readings in connection with the low one (28.48) recorded at Mullaghmore on the 10th give us the large barometric range of 2.52 inches for the month. Low area No. VI, already described as area No. IX in February REVIEW, moved rapidly eastward during the 25th and at the end of the month was central in mid-ocean.

Mr. C. Meldrum furnishes the following notes on cyclones occurring in the neighborhood of Mauritius during the month of December, 1880, and January, 1881. No cyclones were reported during November, the month in which these storms may be first looked for in this region: "From the 15th to the 20th of December, 1880, a cyclone passed north and northwest of Mauritius at a distance of 150 to 200 miles, causing some damage to vessels that put to sea from Reunion. On the 2nd and 3rd of January a hurricane was encountered by the *Berar* in 14° S. and 85° E. From the 10th to the 14th of January a hurricane took place in about 15° S. and 72° E. The *Mairi Bahn* and other vessels were dismasted. A cyclone passed NNW. and west of Mauritius from the 18th to the 21st of January, doing much damage at Reunion on the 21st. Another cyclone passed east and southeast of Mauritius from the 6th to the 13th of February. Information regarding these cyclones is being collected."

Chart No. V shows the mean pressure, temperature and wind force and the prevailing direction of the wind at 7.35 a. m. Washington, or 0.43 p. m. Greenwich, mean time, for the month of *April*, 1877, over the northern, and at certain isolated stations in the southern, hemisphere. The area of lowest pressure is still found central over the Atlantic Ocean, but with a decided translation to the southward, and, so far as observations at stations along the seaboard indicate, with a continued increase in pressure. While we found the lowest mean barometer for January to be 29.17 at Stykkisholm, and at Tromso for February and March 29.44 and 29.59, respectively, we now find the lowest means for April, to be 29.64 at Valencia and 29.65 at Brest. The highest monthly mean (30.14) is that of Portland, Oregon, while next in order of pressure comes York Factory (30.12). These give a total monthly range in the mean pressures for the northern hemisphere during April of only 0.5 inch, while those of January, February and March were, respectively, 1.28, 0.94 and 0.65. The changes found by comparing the mean pressures of April with those of March show a very marked and interesting homogeneity, there being only one line of no change. This zero-line, if we trace it eastward, enters the United States in northern California, runs northeastwardly to Manitoba and thence southeasterly throughout the region of the great lakes and Middle Atlantic States to about the same parallel it had on the Pacific coast; its course then changes toward the northeast, running along the coast of the New England States, through New Brunswick, and apparently leaving the American continent near the Straits of Belle Isle; it reappears upon the European coast in the north of Ireland. After running southeasterly to the Straits of Dover it follows the 50th parallel to central Russia and thence curves northeastwardly to the Obi valley. North of this line the comparisons show a gradual increase in the pressure of April over that of March, the excess at the most northerly stations being, as follows: Esquimalt, +0.15; York Factory, +0.17; Godthaab, +0.32; Stykkisholm, +0.31; Thorshavn, +0.33; Bronö, +0.37; Tromso, +0.33, and Archangel, +0.27 inch. Everywhere to the south of this line, except at certain isolated stations near the equator and in the southern hemisphere, there is a decided decrease, which gradually increases to 0.16 inch in the Lower Mississippi valley, to 0.15 at St. John's Newfoundland, to 0.21 at the Azores, to 0.10 at Lisbon and Algiers, to 0.12 at Beirut and Fao, to 0.22 at Nukuss and Yenisseisk, to 0.20 at Pekin and to 0.17 at Shanghai.

TEMPERATURE OF THE AIR.

The mean temperature of the air for March, 1881, is shown by the isothermal lines (in red) on chart No. II. The table of mean and comparative temperatures, in the right-hand corner of the chart, shows in the first column the average for the month throughout the various districts as deduced principally from observations taken at Signal Service stations. In the two remaining columns are shown the means for the present month and the departures of such means from the average for many years. Throughout a majority of the various districts of the country the temperature is below the normal, while in the Upper and Lower Lake regions no change occurs. The departures of excess, ranging from +0.4 in the Southern Plateau to +8.5 in the Northern Rocky Mountain slope, are confined, with a single exception, to the northern sections of the country, or above parallel 40°; those of deficiency, ranging from —0.4 in the Middle Atlantic States to —4.8 in the South Atlantic States, embracing the southern districts, are most marked in the Gulf and South Atlantic States.

Deviations from Mean Temperatures.—Under this heading, departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures, on the right-hand side of chart No. II. The following items of importance, in connection with this